

APPENDIX C

Biological Survey Report for the Ramona Grasslands Preserve (RECON 2005)

Biological Survey Report for the Ramona Grasslands Preserve, in Ramona, California

Prepared for

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1.0 Summary of Findings

In accordance with the Management and Monitoring Plan for Ramona Grasslands Open Space Preserve (Preserve), RECON conducted Year 1 removal of invasive non-native plants on the Cagney, Hardy, Hobbs, Ramona Airport, Cummings, Oak Country Estates, and a portion of the Voorhes Lane properties. In addition, RECON measured vernal pool hydrology and conducted focused surveys for fairy shrimp and amphibians (including arroyo toad) on the Cagney, Hardy, and Oak Country Estates properties.

The target species for invasive plant removal included artichoke thistle (*Cynara cardunculus*), intermediate wheatgrass (*Elytrigia intermedia*), giant reed (*Arundo donax*), and salt cedar (*Tamarix* sp.). Additional invasive species treated include milk thistle (*Silybum marianum*), Italian thistle (*Carduus pycnocephalus*), and perennial pepperweed (*Lepidium latifolium*). These species were treated using various combinations of hand removal and herbicides to achieve the best results, while protecting many sensitive flora and fauna on the Preserve.

Fairy shrimp were observed in 12 of the 19 vernal pools studied, 11 of which contained the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*). The remaining pool contained immature fairy shrimp too young to identify, but were most likely San Diego fairy shrimp.

Arroyo toads (*Bufo californicus*) were observed or detected at five locations in Santa Maria Creek. These locations were west of Rangeland Road, on the Oak Country Estates property. Western spadefoot toad (*Spea hammondi*) tadpoles were observed in 9 of the 19 vernal pools studied. Pacific tree frog (*Hyla regilla*) tadpoles were observed in three pools, and western toad (*Bufo boreas*) tadpoles were observed in eight pools. Many of these tadpoles successfully matured to toadlets prior to the pools drying.

In addition to the invasive plant species removal and focused wildlife species surveys, vernal pool hydrology was monitored. Vernal pool water depth was monitored weekly, water temperature was measured bi-weekly (in conjunction with the fairy shrimp surveys), and dissolved oxygen levels were measured monthly.

2.0 Introduction

In 2003, the State Water Resources Control Board awarded a Proposition 13 grant for the Santa Maria Creek Protection and Restoration Project, to the County of San Diego for the protection and restoration of a portion of the Santa Maria Creek that flows through the grasslands of the Santa Maria Valley, downstream and west of the community of Ramona (Attachment 1: Figures 1 and 2). The grant provides funds for

acquisition of the former 390-acre Cagney Ranch, which supports grasslands, 23 alkali playas, 45 vernal pools, and 0.6 mile of riparian habitat. The Cagney Ranch acquisition will form the nucleus of San Diego County's Ramona Grasslands Preserve. The grant also funds restoration of the wetland habitats and their watersheds within the Preserve. Overall, the project aims to maximize the spatial and temporal scale of the resource protection and restoration in the grasslands area.

The grant required that a restoration and a habitat monitoring and management plan be developed. The Conservation Biology Institute (CBI) prepared the Framework Management and Monitoring Plan for Ramona Grasslands Open Space Preserve (2004a) and a Restoration Plan for Santa Maria Creek Watershed Management Unit (CBI 2004b), through funding provided by The Nature Conservancy. In accordance with these Plans, RECON conducted Year 1 removal of invasive non-native plants on the Cagney, Hardy, Hobbs, the Ramona Airport, Cummings, Oak Country Estates, and a portion of the Voorhes Lane properties (Attachment 1: Figure 3). In addition, RECON measured vernal pool¹ hydrology, and conducted focused surveys for fairy shrimp and amphibians (including arroyo toad) on the Cagney, Hardy, and Oak Country Estates properties.

3.0 Survey Methods

3.1 Invasive Non-native Plant Removal

Invasive plant species (and their locations) to be treated were previously identified under the Framework Management and Monitoring Plan for Ramona Grasslands Open Space Preserve (CBI 2004a) and a Restoration Plan for Santa Maria Creek Watershed Management Unit (CBI 2004b). These species, or target species, previously identified for removal included artichoke thistle, intermediate wheatgrass, giant reed, and salt cedar. In addition to the target species' locations previously identified, RECON mapped and treated new locations.

Other invasive plants species identified by RECON to be treated included milk thistle, Italian thistle, and perennial pepperweed. These species' locations were mapped and treated in addition to the target species.

¹ Throughout this document, unless otherwise specified, the term "vernal pool" or "pool" includes the vernal swales and alkali playas that were included in the study.

3.1.1 Invasive Plant Removal Restrictions/Limitations

On a project that requires the cooperation of many different landowners, significant coordination and communication is required to insure that all parties understand the process and accept the benefits and risks of spraying herbicide. As this was the first year of invasive plant removal, coordinating with the landowners took some time. Consequently, many of the Voorhes Lane properties were not treated until August and September.

Another issue encountered this spring was the frequency of rainfall occurrences. Herbicide spraying was not conducted when vegetation was wet, or when precipitation was anticipated within 48 hours. The field crew had to reschedule treatments a number of times due to unsuitable spraying conditions, which delayed the overall treatment schedule.

3.1.2 Methodology

Invasive plants were found throughout the Preserve properties, often times along-side sensitive or rare biological resources. Due to the sensitive nature of many flora and fauna on-site, extra care was taken when determining what methodologies for invasive plant removal would be used. RECON restoration biologist Bruce Hanson met and consulted with Mike White (from CBI) and Mike Kelly (Kelly and Associates) on a number of occasions to discuss the most efficient and effective methods of invasive species removal, while considering the sensitive biological resources on-site.

A mixture of weed removal by hand and herbicide use was employed to accomplish the invasive plant removal objectives. The target species for removal included artichoke thistle, intermediate wheatgrass, giant reed, and salt cedar. The properties with the largest numbers of these species, such as the Ramona Airport property, Cagney Ranch, Hardy, and Oak Country Estates, were treated first. The remaining invasive species, including milk thistle, Italian thistle, and pepperweed, were removed as time allowed.

Herbicides used for invasive plant removal included Transline® and AquaMaster™. Transline®, or clopyralid, is a selective, broadleaf herbicide that provides excellent control of many tough broadleaved invasive plants, yet is tolerant to a wide variety of herbaceous and woody plants, including grasses. It is applied as a foliar spray and translocates throughout the plant to the root system, thereby reducing the potential for re-sprouting in perennial plants. It is active in controlling invasive plants, particularly in the Asteraceae and Fabaceae families (Carrithers 1997).

AquaMaster™, a glyphosate isopropylamine salt herbicide, is a non-selective aquatic herbicide that controls emerged vegetation in and around bodies of fresh and salt water. When applied correctly, AquaMaster™ can be used without unreasonable adverse effects to human health or the environment (Monsanto 2002).

3.1.1.1 Artichoke Thistle (*Cynara cardunculus*)

Artichoke thistle, a California Invasive Plant Council (Cal-IPC) List A-1² species, is a spiny thistle of the sunflower family, crowned by a cluster of showy, bright purple thistle flower heads (Bossard et al. 2000). This species is native to the Mediterranean and was introduced to California for ornamental and culinary uses; artichoke thistle spreads in the wild through rapid seed dispersal.

A pilot herbicide treatment study was conducted on the Ramona Airport, Hobbs and Hardy properties to determine the most effective herbicide concentration and/or mixture to control artichoke thistle, while protecting the sensitive resources nearby. Treatment types studied included: 2 percent AquaMaster™; a Transline® (0.25 percent) and AquaMaster™ (2 percent) mixture; 0.25 percent Transline®; and 0.50 percent Transline®. On the Cagney Ranch, both 0.25 percent and 0.50 percent concentrations of Transline® were used. On the Oak Country Estates, the Transline®/AquaMaster™ mixture was used.

3.1.1.2 Intermediate Wheatgrass (*Elytrigia intermedia*)

Intermediate wheatgrass is a sod forming wheatgrass introduced from Russia. This species was introduced to the U.S. as a crop for pasture and hay production (Magness et al. 1971 as cited in Purdue University 2005).

One large patch of intermediate wheatgrass was found on the eastern edge of the Hardy property. This patch was immediately adjacent to a vernal swale, and was also intermixed with southern tarplant (*Centromadia parryi* ssp. *australis*). Much of the annual grasses surrounding the intermediate wheatgrass were removed by hand, and then the intermediate wheatgrass was sprayed with AquaMaster™.

A second small patch of intermediate wheatgrass was found on the Cummings parcel. At the time of removal, the property owner allowed weed removal as long as no herbicides were used. This patch of intermediate wheatgrass was removed by hand.

3.1.1.3 Giant Reed (*Arundo donax*)

Giant reed, a Cal-IPC List A-1 species, is a robust perennial grass nine to thirty feet tall, growing in many-stemmed, cane-like clumps (Bossard et al. 2000). Native to the Mediterranean, this species was introduced to North America where it was harvested for roofing material and musical instruments. Giant reed spreads vegetatively, either by rhizomes or fragments.

² List A-1 includes the most invasive and damaging species that are widespread in California.

Giant reed was removed from Santa Maria Creek on two Voorhes Lane properties, Osbourne and Leggitt, using hand removal and herbicide treatment. The giant reed was first cut off at the base and the removed material was hauled away from the site. The remaining stumps were then coated with AquaMaster™ to prevent re-sprouting.

3.1.1.4 Salt cedar (*Tamarix* sp.)

Salt cedar, a Cal-IPC List A-1 species, is many-branched tree less than 26 feet tall with small scale-like leaves that have salt glands (Bossard et al. 2000). Native to central Asia, this species was used widely in the western United States for erosion control, windbreaks, shade, and ornamental purposes.

Salt cedar was removed from Santa Maria Creek on four Voorhes Lane properties, Dorrah, Berthiaume, Osbourne and Leggitt, using hand removal and herbicide treatment. The salt cedar was first cut off at the base and the removed material was hauled off-site. The remaining stumps were then coated with AquaMaster™ to prevent re-sprouting from occurring.

3.1.1.5 Milk thistle (*Silybum marianum*)/Italian thistle (*Carduus pycnocephalus*)

Milk thistle, a noxious weed, is a biennial thistle with stout, ridged, and generally branching stems up to six feet tall (Whitson et al. 1996). Native to Europe, this weed was introduced for medicinal purposes and has become widely distributed throughout the western U.S.

Italian thistle, a Cal-IPC List B³ species, is an annual thistle with pink to purple flowers and leaves that are white-wooly below and hairless-green above (Bossard et al. 2000). Native to the Mediterranean, southern Europe, North Africa to Pakistan, this species was accidentally introduced to the U.S. in the 1930s.

Treatment of milk thistle and Italian thistle took place in August and September 2005, after the primary invasive species of concern were treated. At the time of treatment, after the thistle had set seed, physical removal of the plant material was determined to be the most effective method of treatment as it was too late in the annual reproductive cycle of the thistle for herbicide to be effective. All aboveground plant material was removed, including seed that was raked from the ground in the surrounding areas, and disposed of off-site.

³ List B includes less invasive species that move into and degrade wildlands.

3.1.1.6 Pepperweed (*Lepidium latifolium*)

Perennial pepperweed, a Cal-IPC List A-1 species, is a multi-stemmed herb that grows three to eight feet tall. Native to Eurasia, this species may have been introduced to California in the 1930s as a contaminant of sugar beet seed (Bossard et al. 2000).

Two patches of pepperweed were mapped in August 2005. One patch was found on the Ramona Airport property, east of Airport Road. The second patch was on the Cummings property. These patches were sprayed with AquaMaster™ in September, after the Cummings property owner consulted with a biologist and allowed spraying to be conducted on his property.

3.2 Fairy Shrimp

3.2.1 Survey Methodology

Prior to initiating surveys, RECON biologist Cheri Kim attended an on-site kick-off meeting with representatives from the County of San Diego Department of Public Works and Parks Departments, CBI, and the Wildlife Research Institute. During this meeting, specific vernal pools, alkali pools, and vernal swales were identified for study. For continuity, RECON used the existing numbers created by EDAW to identify the individual pools. Vernal pools studied included: r24, e44, e45, e46, e52, e53, e54, e56, e58, e59, e62, and e77. Pools within vernal swales include ev1, ev2, vs1, vs2, vs3, and vs4. Alkali playa "Raap 100" was also included in the study. Raap 100, vs1, vs2, vs3, and vs4 were not previously identified or numbered by EDAW, but were identified during the kick-off meeting for inclusion.

Focused surveys for listed fairy shrimp species, such as the San Diego fairy shrimp, were conducted by Cheri Kim under RECON's U.S. Fish and Wildlife Service (USFWS) permit #TE-797665. Survey dates and personnel are shown on Table 1. Surveys were conducted according to USFWS survey guidelines (USFWS 1996) every two weeks, starting January 21, 2005 and ending April 1, 2005. During each survey, the following steps were followed at each pool:

1. Prior to disrupting the water surface of the pool, if the view was relatively clear and unobstructed, the surveyor examined the pool for fairy shrimp to estimate the number of shrimp present.
2. The air temperature, water temperature, and maximum water depth [using staff gauges (see Section 3.4.1)] measurements were recorded.

TABLE 1
SURVEY DATES AND CONDITIONS

Date	Surveyor	Survey	Beginning Conditions	Ending Conditions
1/21/05	Cheri Kim Darin Busby	Fairy shrimp, amphibians, hydrology	Refer to Table 4	Refer to Table 4
1/28/05	Cheri Kim Diana Saucedo-Ortiz	Hydrology	N/A	N/A
2/04/05	Cheri Kim, Nicole Shorey, Brian Woodward	Fairy shrimp, amphibians, hydrology	Refer to Table 4	Refer to Table 4
2/11/05	Cheri Kim Nicole Shorey	Hydrology	N/A	N/A
2/17/05	Cheri Kim Darin Busby	Fairy shrimp, amphibians, hydrology	Refer to Table 4	Refer to Table 4
2/25/05	Cheri Kim Raquel Ordorica	Hydrology	N/A	N/A
3/01/05	Cheri Kim Cheryl Johnson	Fairy shrimp, amphibians, hydrology	Refer to Table 4	Refer to Table 4
3/11/05	Cheri Kim Diana Saucedo-Ortiz	Hydrology	N/A	N/A
3/16/05	Cheri Kim Mark Dodero	Arroyo toad day survey #1	3:00 P.M.; 67°F; 0–2 mph; 50% cover	5:40 P.M.; 62°F; 0–2 mph; 60% cover
3/16/05	Cheri Kim Mark Dodero	Arroyo toad night survey #1	7:00 P.M.; 55°F; 0–2 mph; 80% cover	9:35 P.M.; 50°F; 0–2 mph; 70% cover
3/17/05	Cheri Kim	Fairy shrimp, amphibians, hydrology	Refer to Table 4	Refer to Table 4
3/23/05	Cheri Kim Diana Saucedo-Ortiz	Hydrology	N/A	N/A
4/01/05	Cheri Kim Karen Smith	Fairy shrimp, amphibians, hydrology	Refer to Table 4	Refer to Table 4
4/07/05	Diana Saucedo-Ortiz	Hydrology	N/A	N/A

TABLE 1
SURVEY DATES AND CONDITIONS
(continued)

Date	Surveyor	Survey	Beginning Conditions	Ending Conditions
	Vanessa Lee			
4/13/05	Cheri Kim	Hydrology	N/A	N/A
4/14/05	Cheri Kim Brian Woodward	Arroyo toad day survey #2	4:00 P.M.; 71°F; 4–6 mph; 0% cover	7:15 P.M.; 63°F; 4–6 mph; 0% cover
4/14/05	Cheri Kim Brian Woodward	Arroyo toad night survey #2	8:30 P.M.; 58°F; 0–3 mph; 0% cover	11:00 P.M.; 54°F; 0–3 mph; 0% cover
4/19/05	Cheri Kim	Hydrology	N/A	N/A
4/27/05	Cheri Kim Diana Saucedo-Ortiz	Arroyo toad day survey #3	3:30 P.M.; 65°F; 5–9 mph; 65% cover	7:00 P.M.; 65°F; 3–7 mph; 45% cover
4/27/05	Cheri Kim Diana Saucedo-Ortiz	Arroyo toad night survey #3	8:30 P.M.; 54°F; 3–5 mph; 65% cover	10:30 P.M.; 53°F; 1–3 mph; 10% cover
5/09/05	Cheri Kim Brian Woodward	Arroyo toad day survey #4	4:15 P.M.; 67°F; 8–12 mph; 50% cover	7:00 P.M.; 62°F; 5–10 mph; 50% cover
5/09/05	Cheri Kim Brian Woodward	Arroyo toad night survey #4	8:30 P.M.; 58°F; 3–5 mph; 30% cover	11:15 P.M.; 56°F; 2–4 mph; 40% cover
6/03/05	Cheri Kim Diana Saucedo-Ortiz	Arroyo toad day survey #5	4:30 P.M.; 72°F; 4–8 mph; 0% cover	7:00 P.M.; 70°F; 4–8 mph; 0% cover
6/03/05	Cheri Kim Diana Saucedo-Ortiz	Arroyo toad night survey #5	9:00 P.M.; 64°F; 1–3 mph; 0% cover	11:15 P.M.; 62°F; 0–1 mph; 0% cover
6/14/05	Cheri Kim, Nicole Shorey, Matt Guilliams	Arroyo toad day survey #6	5:30 P.M.; 78°F; 2–4 mph; 0% cover	7:30 P.M.; 77°F; 2–4 mph; 0% cover
6/14/05	Cheri Kim, Nicole Shorey, Matt Guilliams	Arroyo toad night survey #6	9:00 P.M.; 65°F; 2–4 mph; 100% fog cover	10:30 P.M.; 65°F; 2–4 mph; 100% fog cover

N/A = °F = degrees Fahrenheit; mph = miles per hour; % = percent

3. Using an aquarium fish net attached to an extendable painters pole, the surveyor made a three-foot-long sweep through the water to catch any fairy shrimp or other aquatic species that may have been present. All species caught in the net were examined, identified, and then returned to the pool; except fairy shrimp samples that were collected for accessioning⁴.
4. Step 3 was repeated in different locations around the pool approximately 15 to 30 times depending on the size of the pool.

3.2.2 Survey Restrictions/Limitations

Typically, winter rains begin in November or December, and vernal pools begin ponding by late December or early January. With this typical rain schedule, the surveys that began January 21, 2005, would have been timely and in concert with USFWS protocol. Unfortunately, winter rains during the 2004–2005 season began in October 2004, and the vernal pools in the survey area were ponded for weeks prior to the start of the January 21, 2005 fairy shrimp surveys. Based on the survey results (see Section 4.2), it can be inferred that surveys began near the end of the fairy shrimp lifecycle(s)⁵, and it is unknown if the fairy shrimp lifecycle(s) was missed entirely in any of the pools, resulting in false-negative data.

3.3 Amphibians

3.3.1 Survey Methodology

Two types of amphibian surveys were conducted on the Preserve. Beginning in January, surveys for vernal pool amphibians were conducted in conjunction with protocol fairy shrimp surveys. Focused surveys for the federally endangered arroyo toad were conducted within Santa Maria Creek beginning in March.

3.3.1.1 Vernal pool amphibians

RECON conducted surveys for amphibians that occur in vernal pools such as Pacific tree frog, western toad, and western spadefoot toad. These surveys were conducted every two weeks, concurrent within the fairy shrimp surveys. At each pool, the presence

⁴ In accordance with the USFWS survey guidelines (USFWS 1996), fairy shrimp samples collected from each pool will be sent to The Natural History Museum of Los Angeles County. In addition, fairy shrimp samples from each pool will be sent to Dr. Andrew Bohonak at San Diego State University in the Evolutionary Biology Department, to aid his ongoing research on San Diego fairy shrimp (*Branchinecta sandiegonensis*) genetics.

⁵ More than one generation of fairy shrimp can occur in a pool within one ponding season.

or absence, estimated number (e.g. 10s, 100s, 1000s, etc.), and the lifecycle stage (e.g. egg cluster, tadpole, or toadlet) of each species was noted. Survey dates and personnel are shown on Table 1.

3.3.1.2 Arroyo toad

Portions of Santa Maria Creek containing suitable habitat within the Oak County Estates, Cagney, and Hardy properties were surveyed for arroyo toad in accordance with USFWS Survey Protocol (1999). Per the Protocol, surveys were conducted between March 15 and July 1, with a total of six surveys conducted at least seven days apart. Each survey consisted of a daytime and nighttime component. The daytime component included walking the Santa Maria Creek to note habitat conditions and identify any eggs, larvae, or tadpoles present. The nighttime component included walking along Santa Maria Creek and stopping periodically to listen for arroyo toads calling. Survey dates and personnel are shown on Table 1.

3.3.2 Amphibian Survey Restrictions/Limitations

In accordance with USFWS survey protocol, arroyo toad surveys began on March 16; however, due to the early winter rains, amphibian breeding in Santa Maria Creek began early and the young were already in tadpole stage. The overall presence/absence objective of the survey was met as RECON heard and observed a number of adult arroyo toads in Santa Maria Creek, but the exact breeding location was not confirmed.

The Voorhes Lanes properties that had restricted access were surveyed at night (vocal surveys only) from the Hobbs and Cagney property fences.

3.4 Vernal Pool Hydrology

RECON measured three hydrologic vernal pool characteristics in 2005 including water depth, water temperature, and levels of dissolved oxygen. Measurement methods are described below.

3.4.1 Survey Methodology

3.4.1.1 Staff Gauge Installation

Upon identification of the vernal pools to be studied in 2005, RECON installed a staff gauge in each of the study pools. Each staff gauge was constructed of 24-inch-long sections of 1-inch diameter polyvinyl chloride (PVC) pipe, fitted over 30-inch-long sections of 1/2-inch diameter rebar. The gauge was fitted so the PVC pipe and rebar were flush on one end, and the flush end was capped, indicating the top of the

gauge. From the base of each cap, a permanent black marker was used to place marks at 1-inch increments for a total of 18 inches along the gauge. The remaining 6 inches of PVC pipe/12 inches of rebar (underneath the PVC) was left blank. Self-adhesive numbers indicating the pool's identity were placed vertically down the gauge, opposite the side with the inch hash marks.

At each pool, a ruler was used to probe the pool in several locations to determine the deepest point of the pool. The staff gauge was then driven into the ground so that the bottom hash mark, indicating zero inches, was flush with the ground.

3.4.1.2 Pool Depth

The staff gauges for all the vernal pools were monitored weekly from January 21, 2005 to April 19, 2005. The water depth within 0.25 inch was recorded for each pool. If other data was being collected that day, i.e. shrimp/amphibians, the gauges were approached so the surveyor could see the water depth with the naked eye. If no other data was being collected, binoculars were used from the edge of the pools to determine water depth. This was done to minimize disturbance to the vernal pools and their inhabitants.

3.4.1.3 Water Characteristics

Dissolved oxygen levels in each vernal pool were monitored monthly using a Dissolved Oxygen Test Kit (Code 7414/5860) from LaMotte. Dissolved oxygen testing followed instructions and procedures as outlined in the Dissolved Oxygen Test Kit manual.

Water temperatures were recorded in conjunction with fairy shrimp surveys every two weeks (see Section 3.2.1).

3.4.2 Survey Restrictions/Limitations

3.4.2.1 Staff Gauge Installation

Due to the active livestock grazing within the vernal pool habitat, most vernal pools had one- to two-inch-deep hoof imprints throughout the pool bottoms. This artificial micro-topography made it difficult to determine the true bottom depth of many pools. RECON avoided placing the gauges in obvious hoof-print depressions whenever possible, in an attempt to measure the deepest portion of the true pool bottom.

3.4.2.2 Pool Depth

As the vernal pools dried, it was noted that the soil immediately surrounding the staff gauge at vs1 had eroded due to the flow of water through the vernal swale. A small depression measuring 2 inches deep, 2 inches wide and 8 inches long now surrounds

the staff gauge. It is unknown when this depression developed. Due to the small size of the erosional depression, the zero mark on the staff gauged is still representative of the pool at large; however, it may indicate a need to relocate or remove the staff gauge if it is determined the staff gauge is contributing to erosion of the pool bottom.

3.4.2.3 Water Characteristics

Because water levels and characteristics fluctuate so rapidly throughout the rainy season, dissolved oxygen should be measured more frequently; at least every two weeks. More frequent data collection will improve the statistical likelihood of finding correlations between dissolved oxygen and floral/faunal responses in the pools.

4.0 Survey Results

Figures 4-1 through 4-5 (see Attachment 1) show the non-native plant removal and species survey results for tasks RECON completed in 2005 on the Ramona Grasslands/Santa Maria Creek project.

4.1 Invasive Non-native Plant Removal-Year 1

Figures 4-1 through 4-5 show the locations of non-native plant removal that RECON conducted in 2005 on the Ramona Grasslands/Santa Maria Creek project.

Short term results of herbicide use on the artichoke thistle was immediately evident as almost all plants treated died rapidly. The artichoke thistle was treated prior to setting seed, thereby reducing the potential seed source for growth next spring.

Two intermediate wheatgrass patches were treated on the Hardy and Cummings parcels. The annual grasses surrounding the wheatgrass on the Hardy property were trimmed to make the wheatgrass more easily accessible. The wheatgrass was then sprayed. Although the seed source for these species is still present in the vicinity, this treatment reduces the ability for this species to become more established and spread throughout the preserve area. The wheatgrass on the Cummings property was trimmed, but was not sprayed at the owner's request. Trimming this perennial grass reduced the future seed source, but a more aggressive treatment of the wheatgrass on the Cummings parcel will likely be needed to reduce the spread of this species.

A few mature salt cedar trees and giant reed stands were treated (cut and sprayed) in Santa Maria Creek on the Voorhes Lane properties and Cagney Ranch. Small salt cedar seedlings present in Santa Maria Creek, west of Rangeland Road, were also removed. Although the seed source for these species is still present in the Creek, this treatment

reduces the ability for these species to become established and spread throughout Santa Maria Creek.

The milk thistle and Italian thistle on the Voorhes Lane properties had already set seed when treatment occurred. As much seed and plant material as possible was physically removed from the site by hand to reduce the future seed bank; however, the hand removal was likely not as effective long-term as spraying would have been prior to the plants setting seed.

Two clusters of pepperweed were identified on the Ramona Airport and Cummings properties. These clusters were sprayed with AquaMaster™. In order to prevent this highly invasive species from spreading into Santa Maria Creek, an aggressive treatment should continue until this species is eradicated completely from the vicinity.

4.2 Fairy Shrimp

Table 2 lists the vernal pool species observed at each pool during the 2005 protocol surveys, including the dates of observation. Dates that data was not collected due to lack of water in the pools are not shown on the table.

Fairy shrimp were observed in 12 of the 19 vernal pools studies, 11 of which contained the federally endangered San Diego fairy shrimp. On January 21, mature San Diego fairy shrimp were observed in pools e44, e45, e46, e52, e53, e59, e62, e56, e58, and raap 100. On February 4, mature San Diego fairy shrimp were found in e58 and vs1, while juvenile fairy shrimp were found in vs1 and vs2. On February 17, juvenile fairy shrimp were found in e62. Shrimp surveys continued for 6 more weeks (3 surveys), but no more shrimp were observed. Because San Diego fairy shrimp was the only species observed within the survey area, it is assumed that the juveniles observed are San Diego fairy shrimp.

Incidentally, while conducting fairy shrimp surveys on January 21, 2005, a western burrowing owl (*Speotyto cunicularia hypugaea*) observed east of e45 (see Attachment 1: Figure 4-3).

4.3 Amphibians

4.3.1 Vernal Pool Amphibians

Western spadefoot toads were observed in nine vernal pools in 2005. In pools e46 and vs3, tadpoles successfully matured to toadlets before the pools dried. Western spadefoot tadpoles were observed in pools e52, e53, e77, ev1, vs1, vs2 and vs4, but no toadlets were observed. It is possible that the tadpoles in many of these pools did mature to toadlets, and simply dispersed or found cover prior to the next survey.

TABLE 2
VERNAL POOL FAUNA OBSERVED

Pool No.	Date	San Diego Fairy Shrimp	(Total #'s 1's, 10's, 100's, .../ # swipes/ #'s per swipe)			Copepods (Copepoda)	Seed Shrimp (Ostracoda)	Water fleas (Cladocera)	Spadefoot Toad	Other Amphibian Species
			Immature	Fairy Shrimp						
r24	01/21/2005	0/ 20+/ 0		0/ 20+/ 0						
	02/17/2005	0/ 10/ 0		0/ 10/ 0		100s	1000s			PTF tad
	03/01/2005	0/ 10/ 0		0/ 10/ 0		100s				
e44	01/21/2005	2/ 20+/ <1		0/ 20+/ 0						
	02/04/2005	0/ 15/ 0		0/ 15/ 0			100s			
	02/17/2005	0/ 15/ 0		0/ 15/ 0		100s	1000s			
	03/01/2005	0/ 15/ 0		0/ 15/ 0			100s			
e45	01/21/2005	1 female/ 20+/ 0		0/ 20+/ 0		1000s	1000s			
	02/17/2005	0/ 15/ 0		0/ 15/ 0		1000s				
	03/01/2005	0/ 15/ 0		0/ 15/ 0			100s			
	04/01/2005	0/ 15/ 0		0/ 15/ 0			1,000,000s			
e46	01/21/2005	10,000s/ 20/ 8-10		0/ 20+/ 0					10s tad	
	02/04/2005	0/ 20+/ 0		0/ 20+/ 0			100s		1,000s tad	
	02/17/2005	0/ 20+/ 0		0/ 20+/ 0		10,000s			100s tad	
	03/01/2005	0/ 20+/ 0		0/ 20+/ 0			1,000s	100s	100s tad	
	03/17/2005	0/ 20+/ 0		0/ 20+/ 0			1,000s		1,000s tad	
	04/01/2005	0/ 20+/ 0		0/ 20+/ 0			10,000s		100s tad	
	04/07/2005	—		—					100s	
	04/13/2005	—		—					toadlets	
e52	01/21/2005	100s/ 20/ 1		0/ 20+/ 0						
	02/04/2005	0/ 20+/ 0		0/ 20+/ 0			1,000s		10s tad	
	02/17/2005	0/ 20+/ 0		0/ 20+/ 0		1,000s	10000s			
	03/01/2005	0/ 20+/ 0		0/ 20+/ 0			10000s			
	03/17/2005	0/ 20+/ 0		0/ 20+/ 0			1,000s			
e53	01/21/2005	100,000s/ 20/ 10-20		0/ 20+/ 0						
	02/04/2005	0/ 20+/ 0		0/ 20+/ 0			1,000s		10s tad	
	02/17/2005	0/ 20+/ 0		0/ 20+/ 0		1,000s	100000s		100s tad	
	03/01/2005	0/ 20+/ 0		0/ 20+/ 0			100s	100s	100s tad	

TABLE 2
VERNAL POOL FAUNA OBSERVED
(continued)

Pool No.	Date	(Total #'s 1's, 10's, 100's, .../ # swipes/ #'s per swipe)				Copepods (Copepoda)	Seed Shrimp (Ostracoda)	Water fleas (Cladocera)	Spadefoot Toad	Other Amphibian Species
		San Diego	Fairy Shrimp	Immature	Fairy Shrimp					
	03/17/2005	0/ 20+ / 0			0/ 20+ / 0		1,000s		no toadlets observed.	
	04/01/2005	0/ 20+ / 0			0/ 20+ / 0					
e54	01/21/2005	0/ 20+ / 0			0/ 20+ / 0					
	02/17/2005	0/ 20+ / 0			0/ 20+ / 0	100s	1,000s			
	03/01/2005	0/ 20+ / 0			0/ 20+ / 0		100s			
e77	02/17/2005	0/ 20+ / 0			0/ 20+ / 0				100s tad	
	03/01/2005	0/ 20+ / 0			0/ 20+ / 0				100s tad	
	03/11/2005	—			—				No toadlets observed	
	03/17/2005	—			—					
ev1	01/21/2005	0/ 20+ / 0			0/ 20+ / 0		10,000s		1000s tad	PTF tads 1,000s
	02/04/2005	—			—		1,000,000s	10000s	1000s tad	PTF tads 1,000s
	02/17/2005	0/ 30+ / 0			0/ 30+ / 0		1,000,000s		1000s tad	PTF tads 10,000s
	03/01/2005	0/ 20+ / 0			0/ 20+ / 0		100,000s			PTF and WT tads
	03/17/2005	0/ 20+ / 0			0/ 20+ / 0		10,000s	100s	10s tad	WT tads
	04/01/2005	0/ 20+ / 0			0/ 20+ / 0		10,000s			WT tads
	04/07/2005	—			—					WT tads 1,000s
	04/13/2005	—			—					WT tads 1,000s, WT toadlets 100s

TABLE 2
VERNAL POOL FAUNA OBSERVED
(continued)

Pool No.	Date	(Total #'s 1's, 10's, 100's, .../ # swipes/ #'s per swipe)				Copepods (Copepoda)	Seed Shrimp (Ostracoda)	Water fleas (Cladocera)	Spadefoot Toad	Other Amphibian Species
		San Diego	Fairy Shrimp	Immature	Fairy Shrimp					
ev2	01/21/2005	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	1000s				WT tads 1,000s
	02/04/2005	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	1,000,000s				WT tads 1,000s
	02/17/2005	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	10000s	100s	100s		PTF and WT tads
	03/01/2005	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	100s				WT tads 1,000s
	03/17/2005	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	1000s	100s	100s		WT tads 1,000s
	03/23/2005	-	-	-	-					WT tads WT tads 1,000s
	04/01/2005	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	0/ 20+/ 0	10,000s				WT toadlets 1,000s
	04/07/2005	—	—	—	—					
e59	04/13/2005	—	—	—	—					
	01/21/2005	100s/ 40+/ <1	0/ 40+/ 0							dead adult western toad
	02/04/2005	0/ 20+/ 0	0/ 20+/ 0			1,000,000s				WT tads 100,000s
	02/17/2005	0/ 20+/ 0	0/ 20+/ 0			1,000,000s				WT tads 100,000s
	03/01/2005	0/ 20+/ 0	0/ 20+/ 0			1,000,000s				WT tads WT tads
	03/17/2005	0/ 20+/ 0	0/ 20+/ 0			1,000s		1000s		WT tads WT toadlets 1,000s
	04/01/2005	0/ 20+/ 0	0/ 20+/ 0							
	04/13/2005	—	—							
e62	01/21/2005	100s/ 15/ 4	0/ 15/ 0							
	02/17/2005	0/ 15/ 0	10,000s/ 15/ 50							
	03/01/2005	0/ 15/ 0	0/ 15/ 0			1,000,000s		1000s		

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TABLE 2
VERNAL POOL FAUNA OBSERVED
(continued)

Pool No.	Date	(Total #'s 1's, 10's, 100's, .../ # swipes/ #'s per swipe)					Seed Shrimp (Ostracoda)	Water fleas (Cladocera)	Spadefoot Toad	Other Amphibian Species
		San Diego	Fairy Shrimp	Immature Fairy Shrimp	Copepods (Copepoda)					
e56	01/21/2005	10s/ 30+/- 0-1		0/ 30+/- 0						
	02/04/2005	0/ 20+/- 0		0/ 20+/- 0		1000s				
	02/17/2005	0/ 20+/- 0		0/ 20+/- 0		10,000s				
	03/01/2005	0/ 15/ 0		0/ 15/ 0		1,000,000s	1000s			
	03/17/2005	0/ 15/ 0		0/ 15/ 0		1000s				
e58	01/21/2005	100s/ 20+/- 0-2		0/ 20+/- 0		100s				
	02/04/2005	10s/ 15/ 1		0/ 15/ 0		1000s				
	02/17/2005	0/ 20+/- 0		0/ 20+/- 0		1000s				
	03/01/2005	0/ 15/ 0		0/ 15/ 0		10,000s	1000s			
	03/17/2005	0/ 15/ 0		0/ 15/ 0		1,000s				
raap 100	01/21/2005	100s/ 20+/- 0-1		0/ 20+/- 0						
	02/04/2005	0/ 20+/- 0		0/ 20+/- 0		1000s				
	02/17/2005	0/ 20+/- 0		0/ 20+/- 0		1000s				
	03/01/2005	0/ 20+/- 0		0/ 20+/- 0		100s				
	03/11/2005	—		—						WT tad 100s
	03/17/2005	0/ 20+/- 0		0/ 20+/- 0						WT tad 100s
	04/01/2005	0/ 20+/- 0		0/ 20+/- 0			100s			WT tad 100s
	04/13/2005	—		—						WT toadlets 10s
vs1	02/04/2005	100s/ 10/ 8		100s / 10/ 8						
	02/17/2005	0/ 20+/- 0		0/ 20+/- 0		1000s	1000s		WT tad 100s	
	03/01/2005	0/ 20+/- 0		0/ 20+/- 0			10,000s			
	03/11/2005	—								WT tad 100s
	03/17/2005	0/ 20+/- 0		0/ 20+/- 0		1000s				WT tad 10s
	04/01/2005	0/ 20+/- 0		0/ 20+/- 0		1000s				WT tad 10s
	04/07/2005	—		—				10s		
	04/13/2005	—		—						No toadlets observed
vs2	02/04/2005	0/ 35+/- 0		10s/ 35+/- 0-1		1,000,000s	10,000s			
	02/17/2005	0/ 20+/- 0		0/ 20+/- 0		10,000s	10,000s			

RECQN

TABLE 2
VERNAL POOL FAUNA OBSERVED
(continued)

Pool No.	Date	(Total #'s 1's, 10's, 100's, .../ # swipes/ #'s per swipe)					Seed Shrimp (Ostracoda)	Water fleas (Cladocera)	Spadefoot Toad	Other Amphibian Species
		San Diego	Fairy Shrimp	Immature	Fairy Shrimp	Copepods (Copepoda)				
vs3	03/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1,000,000s				WT tad
	03/11/2005	—	—	—	—					WT tad
	03/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	10,000s				WT tad
	04/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1000s		100s		10,000s
	04/07/2005	—	—	—	—				1000s	WT tad
	04/13/2005	—	—	—	—					WT toadlets 100s
	02/04/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	10,000s		10,000s		
	02/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	100,000s		100,000s		
	03/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1,000,000s				WT tad
	03/11/2005	—	—	—	—					WT tad
vs4	03/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	10,000s				WT tad
	04/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1000s		100s		10,000s
	04/07/2005	—	—	—	—				1000s tads 100s	WT tad
	04/13/2005	—	—	—	—				toadlets	WT toadlets 100s
	02/04/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	100s				
	02/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	10,000s		10,000s		WT tad 100s
	03/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1,000,000s				WT tad
	03/11/2005	—	—	—	—					WT tad
	03/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1,000				WT tad
	04/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	100s		100s		1000s
vs4	04/07/2005	—	—	—	—				1000s	WT tad
	04/13/2005	—	—	—	—					WT tad
	02/04/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	100s				WT tadlets 100s
	02/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	10,000s		10,000s		
	03/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1,000,000s				
	03/11/2005	—	—	—	—					
	03/17/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	1,000				
	04/01/2005	0/ 20+/ 0	0/ 20+/ 0	—	0/ 20+/ 0	100s		100s		
	04/07/2005	—	—	—	—				1000s	
	04/13/2005	—	—	—	—					WT toadlets 100s

PFT = Pacific Tree Frog; Tad = Tadpole; WT = Western Toad
 — = Only hydrology surveys performed this day.

Pacific tree frog tadpoles were observed in r24, ev1, and ev2. In r24, the tadpoles were observed only once, and it is unknown if this species matured to toadlets. In ev1, tadpoles of this species were observed on four occasions, increasing the likelihood that this species mature to toadlet stage and remained hidden during subsequent vernal pools surveys.

Western toad tadpoles were observed in ev1, ev2, e59, raap100, vs1, vs2, vs3, and vs4. RECON confirmed that the tadpoles in seven pools, ev1, ev2, e59, raap100, vs2, vs3, and vs4, matured to toadlets. Western toad tadpoles in vs2 likely matured to toadlets as well, but dispersed or found cover prior to the next survey.

Table 2 lists the vernal pool species observed at each pool, including the dates of observation.

4.3.2 Arroyo Toads

Arroyo toads were observed and detected in Santa Maria Creek, west of Rangeland Road, on the Oak Country Estates property. As seen on Table 3, at the beginning of protocol surveys, arroyo toads were observed calling within 500 feet of Rangeland Road. As the season progressed, the toad observations/vocalizations retreated to the west. During the last two surveys, the only arroyo toads detected were at the west end of Oak Country Estates, in a pond where a two-track dirt road intersects the creek (see Attachment 1: Figure 4-1), and in the creek at the western boundary of the property.

While conducting arroyo toad surveys, RECON noted the presence of adult and juvenile bullfrogs in four locations along Santa Maria Creek. The bullfrogs were eradicated whenever possible, using a pump-action pellet gun. This method was relatively successful for the juvenile bullfrogs; but was largely unsuccessful for the adult bullfrogs, as the pellets appeared to have little adverse effect on them.

TABLE 3
ARROYO TOAD OBSERVATIONS/DETECTIONS

Location	Date	Number of Adults	Detection Type
Location 1: 500 feet west of Rangeland road	3/16/05	3	Observation
Location 2: 1,300 feet west of Rangeland Road*	3/16/05	2	Vocalization
	4/14/05	2	Vocalization
Location 3: 2,300 feet west of Rangeland Road*	4/14/05	2	Vocalization
	4/27/05	2	Vocalization
Location 4: 3,200 feet west of Rangeland Road (Pond)	3/16/05	2	Observation
	4/14/05	3	Observation
	5/9/05	2	Observation
	6/3/05	3	Observation
Location 5: 3,800 feet west of Rangeland Road*	5/9/05	2	Vocalization
	6/3/05	2	Vocalization
	6/14/05	2	Vocalization

*Locations based on vocalizations with no direct observations are approximate.

4.4 Vernal Pool Hydrology

San Diego County received record-breaking rainfall during the 2004–2005 rain season. From October 2004 through May 2005, the Ramona Fire Station recorded 27.24 inches of rain, a significantly greater amount than the average 16.67 inches per year Ramona typically receives (Western Regional Climate Center 2005). The vernal pools likely filled in October and remained full through most, if not all, of November, December, and January prior to the start of surveys.

The vernal pools (r24, e44, e45, e46, e52, e53, e54, e56, e58, e62, and e77) and the alkali playa (raap100) all responded similarly to rain events this spring. Most pools held water during the survey on January 21, and were dried by the next survey on February 4. A series of rainfall events filled the pools again, and most pools held water from February 17 until mid-March, or shortly thereafter. The final significant rain event occurred prior to the March 23 survey, and all pools were dry for the season by April 19, when hydrology studies concluded. Of the 13 weeks hydrology measurements were taken, e77 was dry during eight of those weeks, the driest of the pools; e59 retained water the longest and was the last pool to dry.

The vernal swale measurement locations, ev1, ev2, vs1, vs2, vs3, and vs4, showed water level responses to rainfall similar to the vernal pools, but that did not dry completely until the conclusion of the hydrology studies. In fact, ev1, a man-made stock pond within a vernal swale, held 25 inches of water in one corner of the pond when surveys concluded.

Dissolved oxygen levels and water temperature provided no apparent correlation with observed fairy shrimp or amphibian records. A structured experimental design and statistical analysis would be required to glean this information.

The water depth, temperature, and dissolved oxygen levels of the study pools are shown on Table 4. Photographs of each pool, taken on February 4, 2005, are shown in Attachment 2.

TABLE 4
VERNAL POOL HYDROLOGY DATA

Pool No.	Date	Water Temperature (Fahrenheit)	Air Temperature (Fahrenheit)	Max Pool depth (inches)	Dissolved Oxygen (parts per meter)
r24	01/21/2005	59	67	2.5	—
	02/04/2005	Dry	64	Dry	—
	02/11/2005	—	—	0.25	—
	02/17/2005	56	66	5.5	—
	02/25/2005	—	—	6.3	—
	03/01/2005	60	63	5	10.0
	03/11/2005	—	—	3.5	—
	03/17/2005	Dry	67	Dry	—
	03/23/2005	—	—	3	—
	04/01/2005	Dry	71	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
e44	01/21/2005	74	74	2	—
	02/04/2005	57	63	2	11.2
	02/11/2005	—	—	2	—
	02/17/2005	59	66	4.15	—
	02/25/2005	—	—	5.6	—
	03/01/2005	74	66	3.75	14.6
	03/11/2005	—	—	2	—
	03/17/2005	Dry	67	Dry	—
	03/23/2005	—	—	4.25	—
	04/01/2005	Dry	71	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
e45	01/21/2005	61	67	2.5	—
	02/04/2005	Dry	64	Dry	—
	02/11/2005	—	—	2.5	—
	02/17/2005	57	66	3	—
	02/25/2005	—	—	3	—
	03/01/2005	63	63	3	8.8
	03/11/2005	—	—	2.5	—
	03/17/2005	Dry	67	Dry	—
	03/23/2005	—	—	3	—
	04/01/2005	65	71	2	2.4
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
e46	01/21/2005	63	67	7	—
	02/04/2005	55	64	4.2	9.5
	02/11/2005	—	—	4	—
	02/17/2005	58	66	7	—
	02/25/2005	—	—	7.25	—
	03/01/2005	64	63	6.5	10
	03/11/2005	—	—	6	—
	03/17/2005	59	67	4.5	—
	03/23/2005	—	—	5	—
	04/01/2005	64	71	2.5	13.3

TABLE 4
VERNAL POOL HYDROLOGY DATA
(continued)

Pool No.	Date	Water Temperature (Fahrenheit)	Air Temperature (Fahrenheit)	Max Pool depth (inches)	Dissolved Oxygen (parts per meter)
e52	04/07/2005	—	—	0.5	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
	01/21/2005	63	67	6	—
	02/04/2005	56	64	5.1	12.5
	02/11/2005	—	—	4.5	—
	02/17/2005	58	66	7	—
	02/25/2005	—	—	7.25	—
	03/01/2005	63	63	7	11.2
	03/11/2005	—	—	6	—
	03/17/2005	64	67	4	—
	03/23/2005	—	—	5.5	—
	04/01/2005	Dry	71	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
e53	04/19/2005	—	—	Dry	—
	01/21/2005	67	67	6	—
	02/04/2005	58	63	4.5	8.7
	02/11/2005	—	—	3.75	—
	02/17/2005	59	66	7.25	—
	02/25/2005	—	—	8	—
	03/01/2005	71	66	7	13.6
	03/11/2005	—	—	6.5	—
	03/17/2005	59	67	4.75	—
	03/23/2005	—	—	5.2	—
	04/01/2005	72	71	2	14.1
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
e54	01/21/2005	71	67	2	—
	02/04/2005	Dry	63	Dry	—
	02/11/2005	—	—	1	—
	02/17/2005	60	66	2	—
	02/25/2005	—	—	2	—
	03/01/2005	73	66	2	7.0
	03/11/2005	—	—	1.75	—
	03/17/2005	Dry	67	Dry	—
	03/23/2005	—	—	2	—
	04/01/2005	Dry	71	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
e77	01/21/2005	Dry	74	Dry	—
	02/04/2005	Dry	63	Dry	—
	02/11/2005	—	—	Dry	—
	02/17/2005	60	66	3.5	—
	02/25/2005	—	—	5.5	—
	03/01/2005	76	66	3	9.0
	03/11/2005	—	—	0.75	—

TABLE 4
VERNAL POOL HYDROLOGY DATA
(continued)

Pool No.	Date	Water Temperature (Fahrenheit)	Air Temperature (Fahrenheit)	Max Pool depth (inches)	Dissolved Oxygen (parts per meter)
ev1	03/17/2005	Dry	67	Dry	—
	03/23/2005	—	—	0.6	—
	04/01/2005	Dry	71	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
	01/21/2005	65	75	35	—
	02/04/2005	57	63	32.5	9.0
	02/11/2005	—	—	30.5	—
	02/17/2005	57	67	34.5	—
	02/25/2005	—	—	36.25	—
	03/01/2005	69	66	35.75	14.0
	03/11/2005	—	—	33.25	—
	03/17/2005	74	73	32.25	—
	03/23/2005	—	—	31	—
	04/01/2005	70	76	30.5	10.6
ev2	04/07/2005	—	—	29	—
	04/13/2005	—	—	27.25	—
	04/19/2005	—	—	25	—
	01/21/2005	73	74	6.5	—
	02/04/2005	61	66	8.5	12.0
	02/11/2005	—	—	8	—
	02/17/2005	57	67	11.25	—
	02/25/2005	—	—	13	—
	03/01/2005	68	66	13	14.4
	03/11/2005	—	—	12.5	—
	03/17/2005	72	73	10.5	—
	03/23/2005	—	—	11	—
	04/01/2005	75	76	9	11.9
	04/07/2005	—	—	7.5	—
	04/13/2005	—	—	5	—
	04/19/2005	—	—	Dry	—
e59	01/21/2005	72	74	6.5	—
	02/04/2005	71	66	6	11.5
	02/11/2005	—	—	5	—
	02/17/2005	59	66	7	—
	02/25/2005	—	—	7	—
	03/01/2005	71	64	7	11.8
	03/11/2005	—	—	7	—
	03/17/2005	72	73	6	—
	03/23/2005	—	—	8.1	—
	04/01/2005	62	76	5.5	10.3
	04/07/2005	—	—	4	—
	04/13/2005	—	—	1	—
	04/19/2005	—	—	Dry	—
	01/21/2005	73	72	2	—
	02/04/2005	Dry	66	Dry	—
	02/11/2005	—	—	0.5	—
	02/17/2005	58	66	6.5	—

TABLE 4
VERNAL POOL HYDROLOGY DATA
(continued)

Pool No.	Date	Water Temperature (Fahrenheit)	Air Temperature (Fahrenheit)	Max Pool depth (inches)	Dissolved Oxygen (parts per meter)
e56	02/25/2005	—	—	8	—
	03/01/2005	69	64	6	9.0
	03/11/2005	—	—	4.5	—
	03/17/2005	Dry	73	Dry	—
	03/23/2005	—	—	Dry	—
	04/01/2005	Dry	76	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
	01/21/2005	71	74	4.5	—
	02/04/2005	68	66	2	10.0
	02/11/2005	—	—	2	—
	02/17/2005	64	66	30	—
	02/25/2005	—	—	4	—
	03/01/2005	66	64	3.5	10.0
	03/11/2005	—	—	3.3	—
	03/17/2005	74	73	2	—
	03/23/2005	—	—	Dry	—
	04/01/2005	Dry	76	Dry	—
e58	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
	01/21/2005	71	73	4	—
	02/04/2005	68	66	5	10.0
	02/11/2005	—	—	4.5	—
	02/17/2005	62	66	7	—
	02/25/2005	—	—	8.5	—
	03/01/2005	68	64	7	9.8
	03/11/2005	—	—	6.25	—
	03/17/2005	67	73	4	—
	03/23/2005	—	—	2	—
	04/01/2005	Dry	76	Dry	—
	04/07/2005	—	—	Dry	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
raap 100	01/21/2005	69	73	5	—
	02/04/2005	68	66	5.5	7.0
	02/11/2005	—	—	5.75	—
	02/17/2005	62	66	8	—
	02/25/2005	—	—	9.5	—
	03/01/2005	69	64	8.5	7.1
	03/11/2005	—	—	8	—
	03/17/2005	79	75	6.5	—
	03/23/2005	—	—	9	—
	04/01/2005	78	76	5.3	8.6
	04/07/2005	—	—	0.75	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—

TABLE 4
VERNAL POOL HYDROLOGY DATA
(continued)

Pool No.	Date	Water Temperature (Fahrenheit)	Air Temperature (Fahrenheit)	Max Pool depth (inches)	Dissolved Oxygen (parts per meter)
vs1	02/04/2005	64	66	7.5	10.8
	02/11/2005	—	—	6	—
	02/17/2005	58	66	10	—
	02/25/2005	—	—	11.6	—
	03/01/2005	67	64	10	9.8
	03/11/2005	—	—	9.5	—
	03/17/2005	70	75	7.5	—
	03/23/2005	—	—	10.5	—
	04/01/2005	73	76	40.25	10.6
	04/07/2005	—	—	—1*	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
vs2	02/04/2005	69	64	14	12.6
	02/11/2005	—	—	17	—
	02/17/2005	60	66	16.5	—
	02/25/2005	—	—	20	—
	03/01/2005	66	64	18.5	13.0
	03/11/2005	—	—	18	—
	03/17/2005	72	75	16.5	—
	03/23/2005	—	—	19	—
	04/01/2005	74	76	14	18.1
	04/07/2005	—	—	10	—
	04/13/2005	—	—	6.5	—
	04/19/2005	—	—	Dry	—
vs3	02/04/2005	63	64	12	13.8
	02/11/2005	—	—	16	—
	02/17/2005	61	66	15	—
	02/25/2005	—	—	19	—
	03/01/2005	66	64	17.75	13.4
	03/11/2005	—	—	17	—
	03/17/2005	70	75	14	—
	03/23/2005	—	—	18	—
	04/01/2005	77	76	12	11.7
	04/07/2005	—	—	6	—
	04/13/2005	—	—	Dry	—
	04/19/2005	—	—	Dry	—
vs4	02/04/2005	67	64	6	13.25
	02/11/2005	—	—	10	—
	02/17/2005	60	66	8	—
	02/25/2005	—	—	14	—
	03/01/2005	66	64	12	13.0
	03/11/2005	—	—	6	—
	03/17/2005	71	75	6	—
	03/23/2005	—	—	11.5	—
	04/01/2005	79	76	3.5	12.4
	04/07/2005	—	—	3	—
	04/13/2005	—	—	1	—
	04/19/2005	—	—	Dry	—

*Water has eroded around the base of the staff gauge about 2 inches below 0 mark.

5.0 References Cited

Bossard, C. C., J.M. Randall, and M.C. Hoshovsky

2000 *Invasive Plants of California's Wildlands*. University of California Press.

Carrithers, V. F.

1997 Using Transline® Herbicide to Control Invasive Plants. California Exotic Pest Plant Council. *1997 Symposium Proceedings*.

Conservation Biology Institute (CBI)

2004a Framework Management and Monitoring Plan for Ramona Grasslands Open Space Preserve.

2004b Restoration Plan for Santa Maria Creek Watershed Management Unit, San Diego, California. The Nature Conservancy. November.

Monsanto Technology, LLC

2002 AquaMaster™ Technical Fact Sheet. January.

Purdue University

2005 Intermediate Wheatgrass. Purdue University, Center for New Crops & Plants Products. Cite Accessed on September 30. <http://www.hort.purdue.edu/newcrop/Crops/Intermediate_wheatgrass.html>

U.S. Fish and Wildlife Service (USFWS)

1996 Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods.

1999 Survey Protocol for the Arroyo Toad. May 19.

Western Regional Climate Center

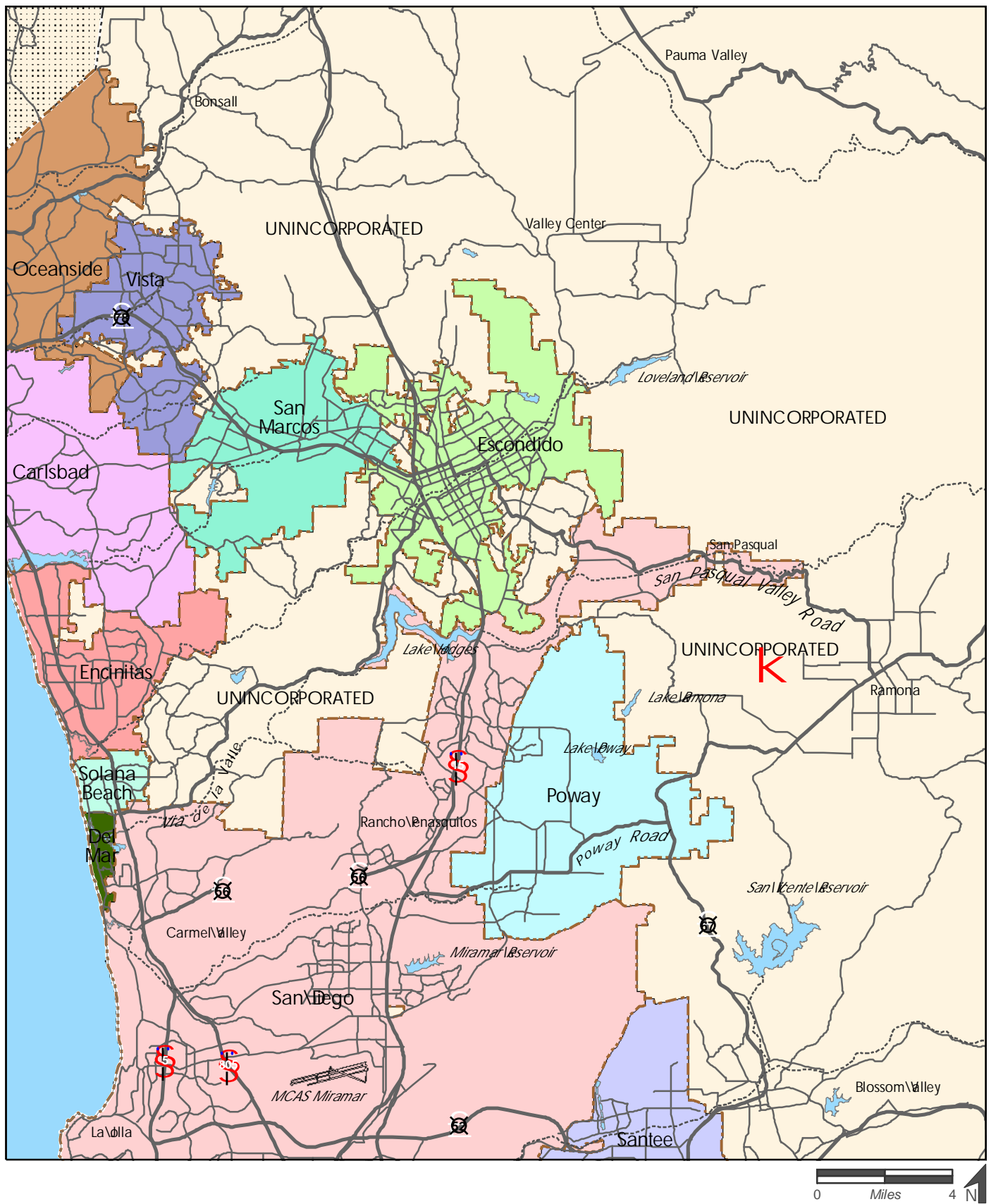
2005 Ramona Fire Department, California, Monthly Total Precipitation (inches). <<http://www.wrcc.dri.edu/cgi-bin/cliMONTpre.pl?caramo>>. Cite Accessed September 30.

Whitson, T.D., L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, and R. Parker

1996 *Weeds of the West*. The Western Society of Weed Science and University of Wyoming.

ATTACHMENTS

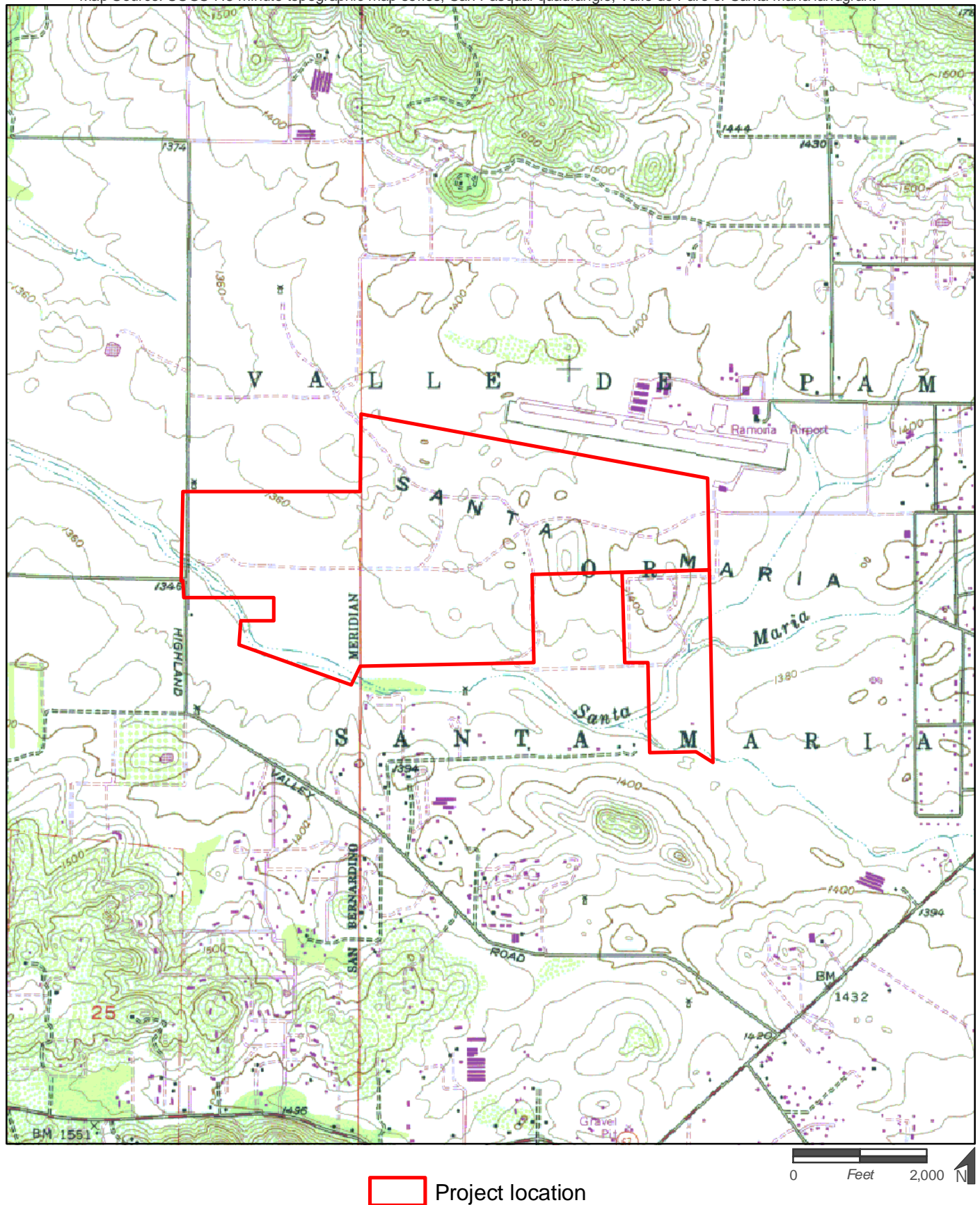
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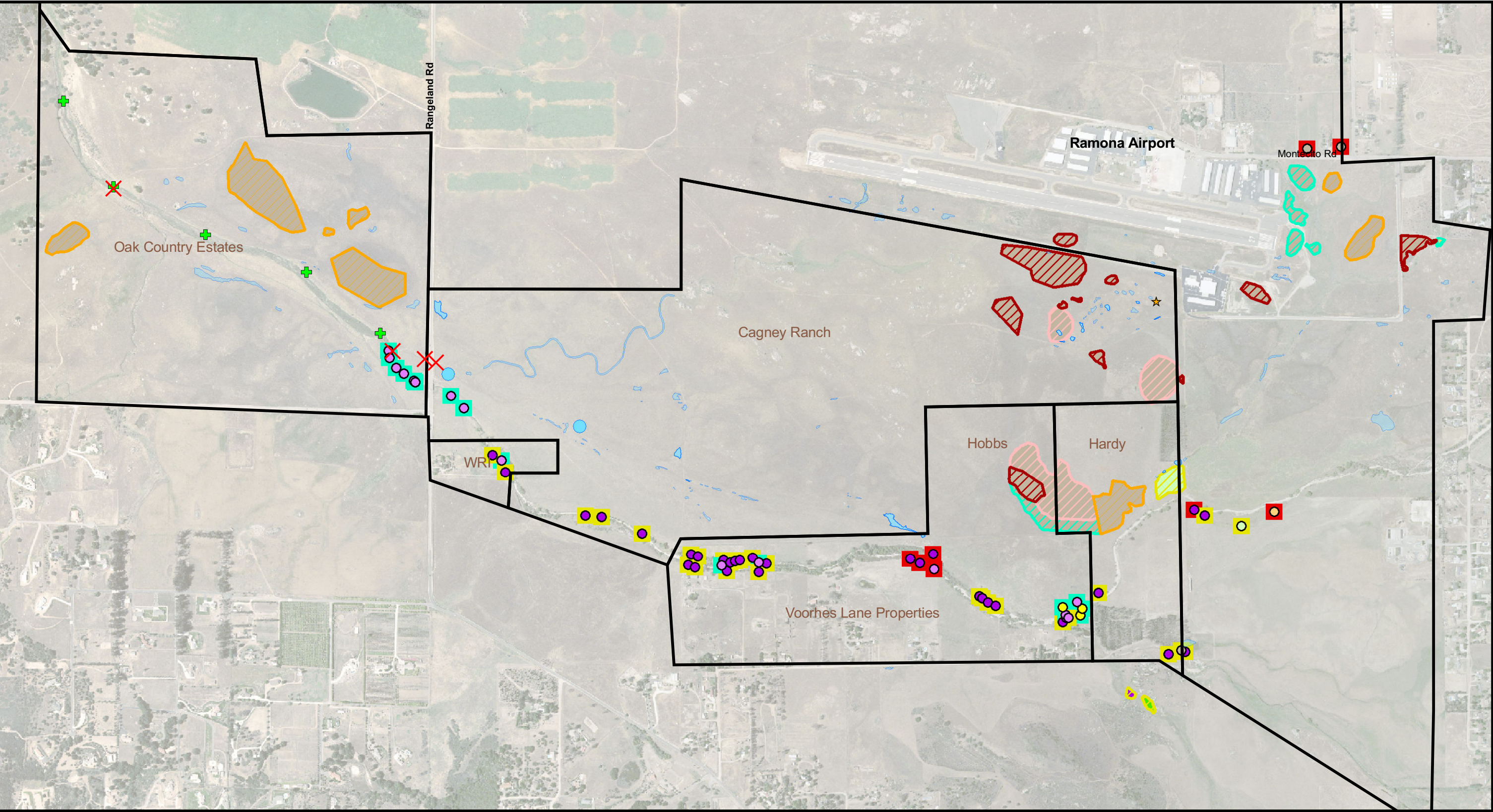


K Project location

FIGURE 1
Regional Location

Map Source: USGS 7.5 minute topographic map series, San Pasqual quadrangle, Valle de Paro or Santa Maria landgrant





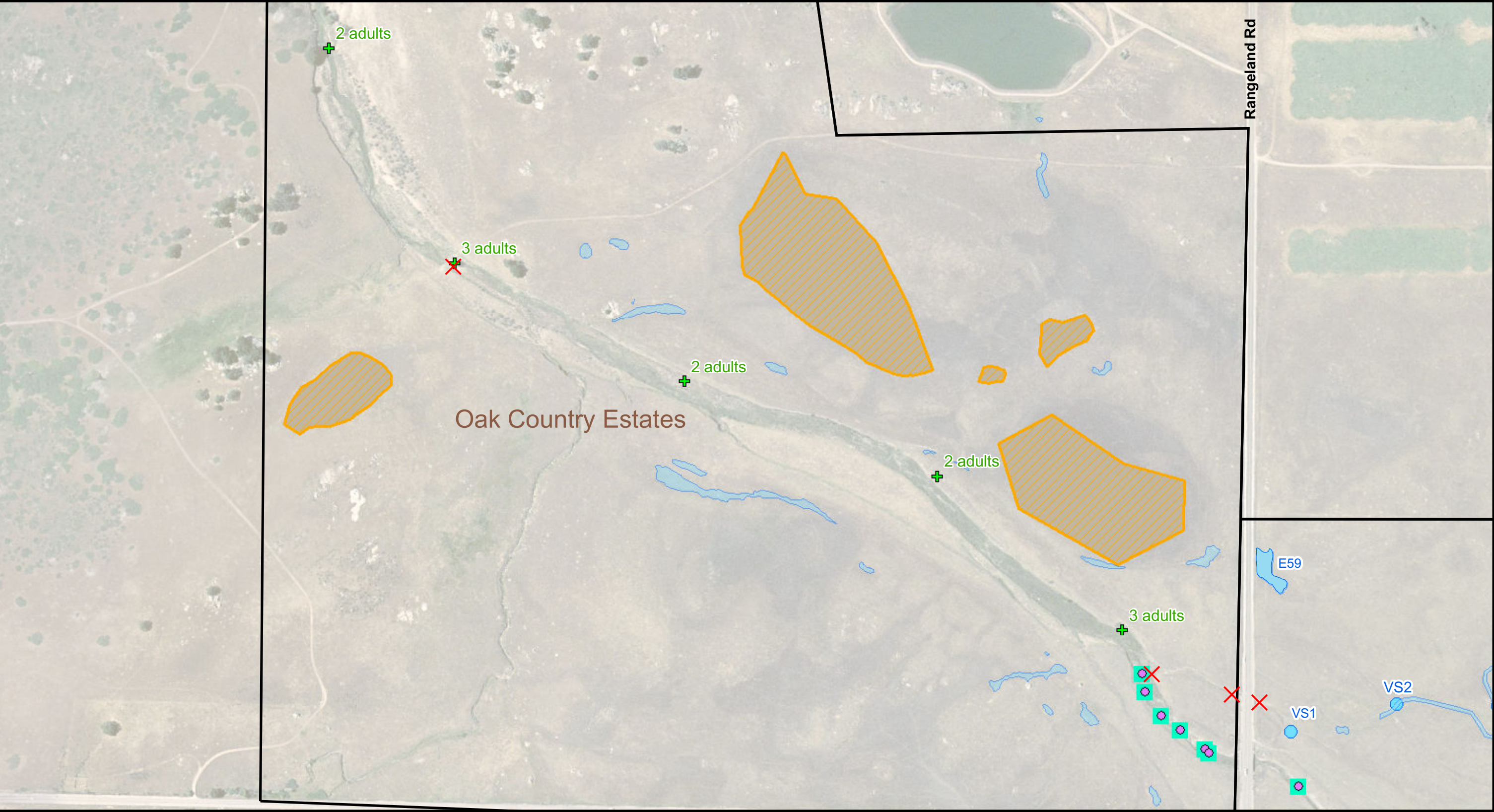
- Property boundaries
- Vernal Pools
- Burrowing owl
- Arroyo toad
- Bullfrog

- Exotic species**
- Artichoke thistle (*Cynara cardunculus*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)
 - Italian thistle (*Carduus pycnocephalus*)
 - Milk thistle (*Silybum marianum*)
 - Giant cane (*Arundo donax*)
 - Lepidium (*Lepidium latifolium*)
 - Tamarisk (*Tamarix sp.*)

- Treatment method**
- Aqua Master 2.0%
 - Hand removed
 - Transline 0.25% & Aqua Master 2.0%
 - Transline 0.25%
 - Transline 0.5%
 - No action

0 Feet 1,000 N

FIGURE 3
Overview: Ramona Grasslands
2005 Survey Results and
Exotic Species Removal



- Property boundaries
- Vernal Pools
- Burrowing owl
- Arroyo toad
- Bullfrog

- Exotic species**
- Artichoke thistle (*Cynara cardunculus*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)
 - Italian thistle (*Carduus pycnocephalus*)
 - Milk thistle (*Silybum marianum*)
 - Giant cane (*Arundo donax*)
 - Lepidium (*Lepidium latifolium*)
 - Tamarisk (*Tamarix sp.*)

- Treatment method**
- Aqua Master
 - Hand removed
 - Transline & Aqua Master
 - Transline 32oz
 - Transline 84oz
 - No action

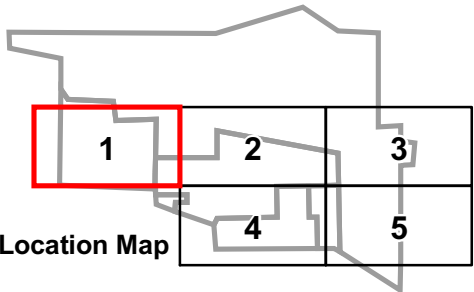
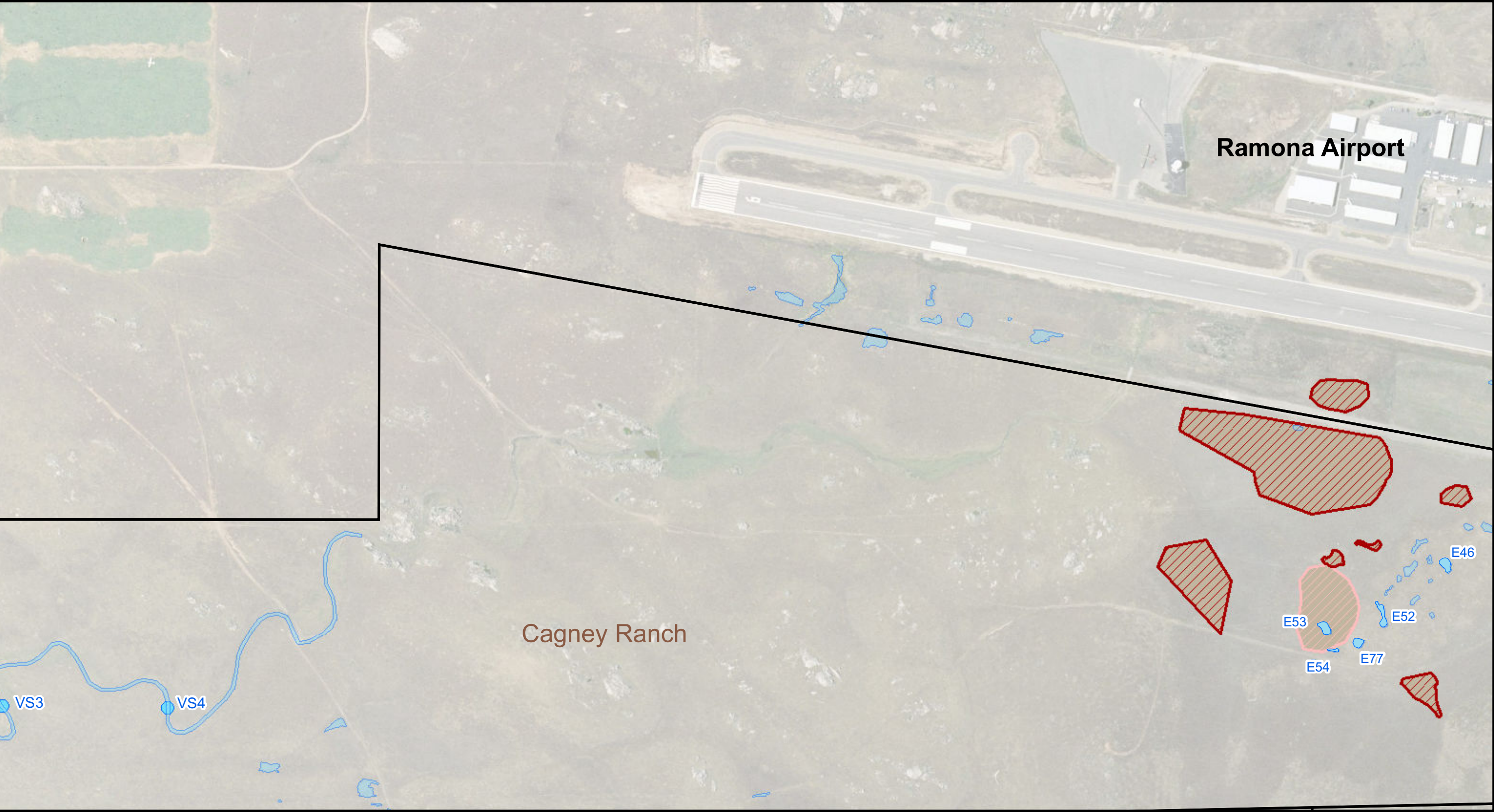


FIGURE 4-1
Ramona Grasslands
2005 Survey Results and
Exotic Species Removal



- Property boundaries
- Vernal Pools
- Burrowing owl
- Arroyo toad
- Bullfrog

- Exotic species**
- Artichoke thistle (*Cynara cardunculus*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)
 - Italian thistle (*Carduus pycnocephalus*)
 - Milk thistle (*Silybum marianum*)
 - Giant cane (*Arundo donax*)
 - Lepidium (*Lepidium latifolium*)
 - Tamarisk (*Tamarix sp.*)

- Treatment method**
- Aqua Master
 - Hand removed
 - Transline & Aqua Master
 - Transline 32oz
 - Transline 84oz
 - No action

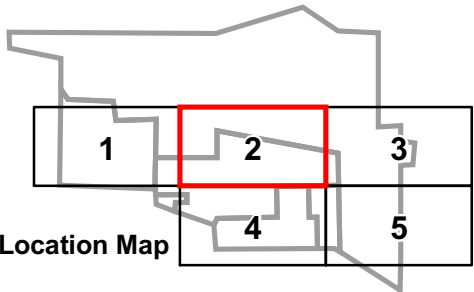
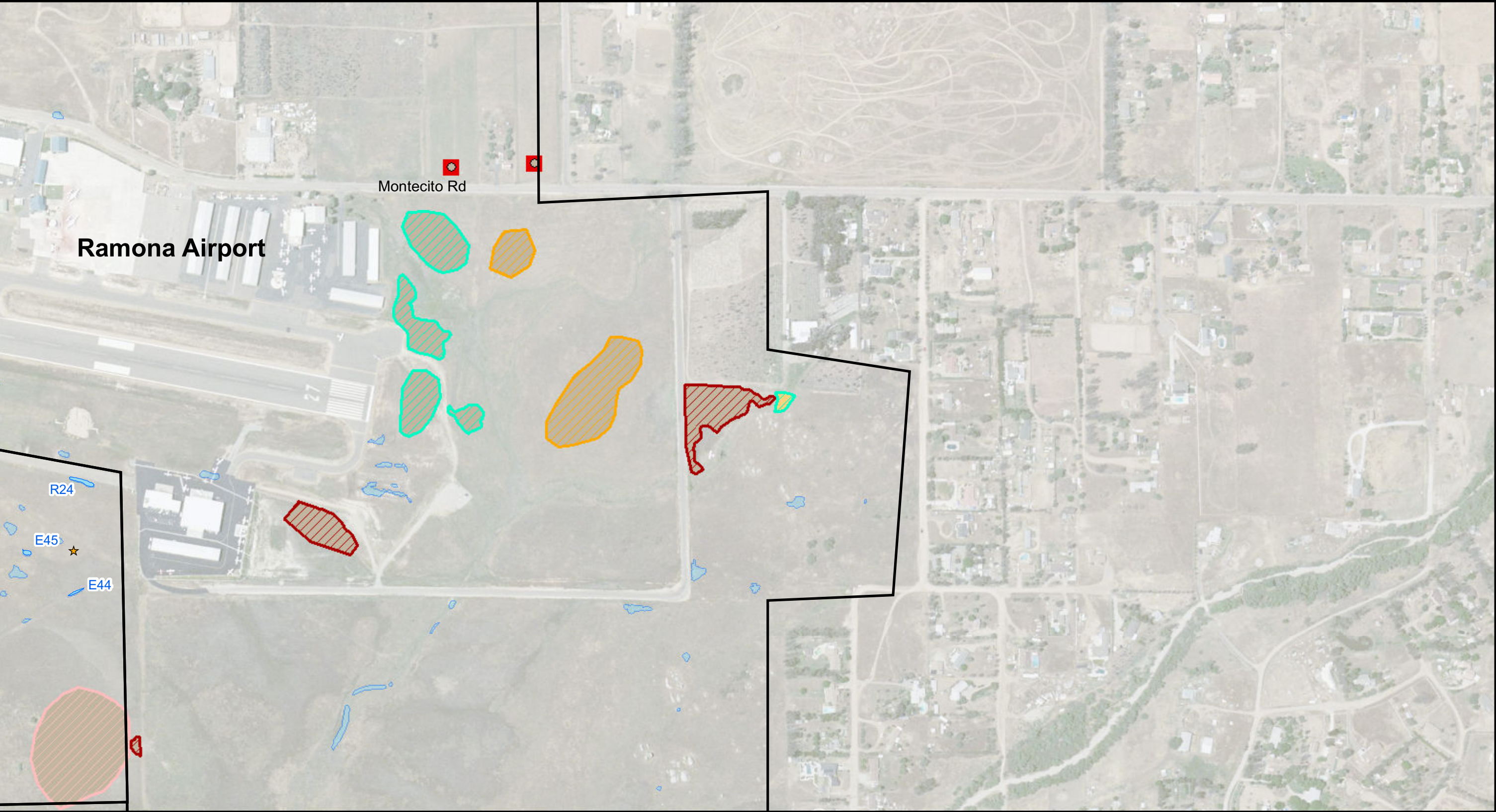


FIGURE 4-2
Ramona Grasslands
2005 Survey Results and
Exotic Species Removal



- Property boundaries
- Vernal Pools
- Burrowing owl
- Arroyo toad
- Bullfrog

- Exotic species**
- Artichoke thistle (*Cynara cardunculus*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)
 - Italian thistle (*Carduus pycnocephalus*)
 - Milk thistle (*Silybum marianum*)
 - Giant cane (*Arundo donax*)
 - Lepidium (*Lepidium latifolium*)
 - Tamarisk (*Tamarix sp.*)

- Treatment method**
- Aqua Master
 - Hand removed
 - Transline & Aqua Master
 - Transline 32oz
 - Transline 84oz
 - No action

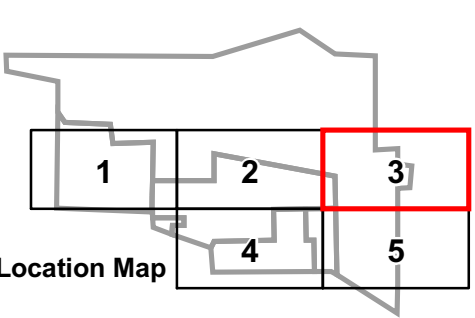
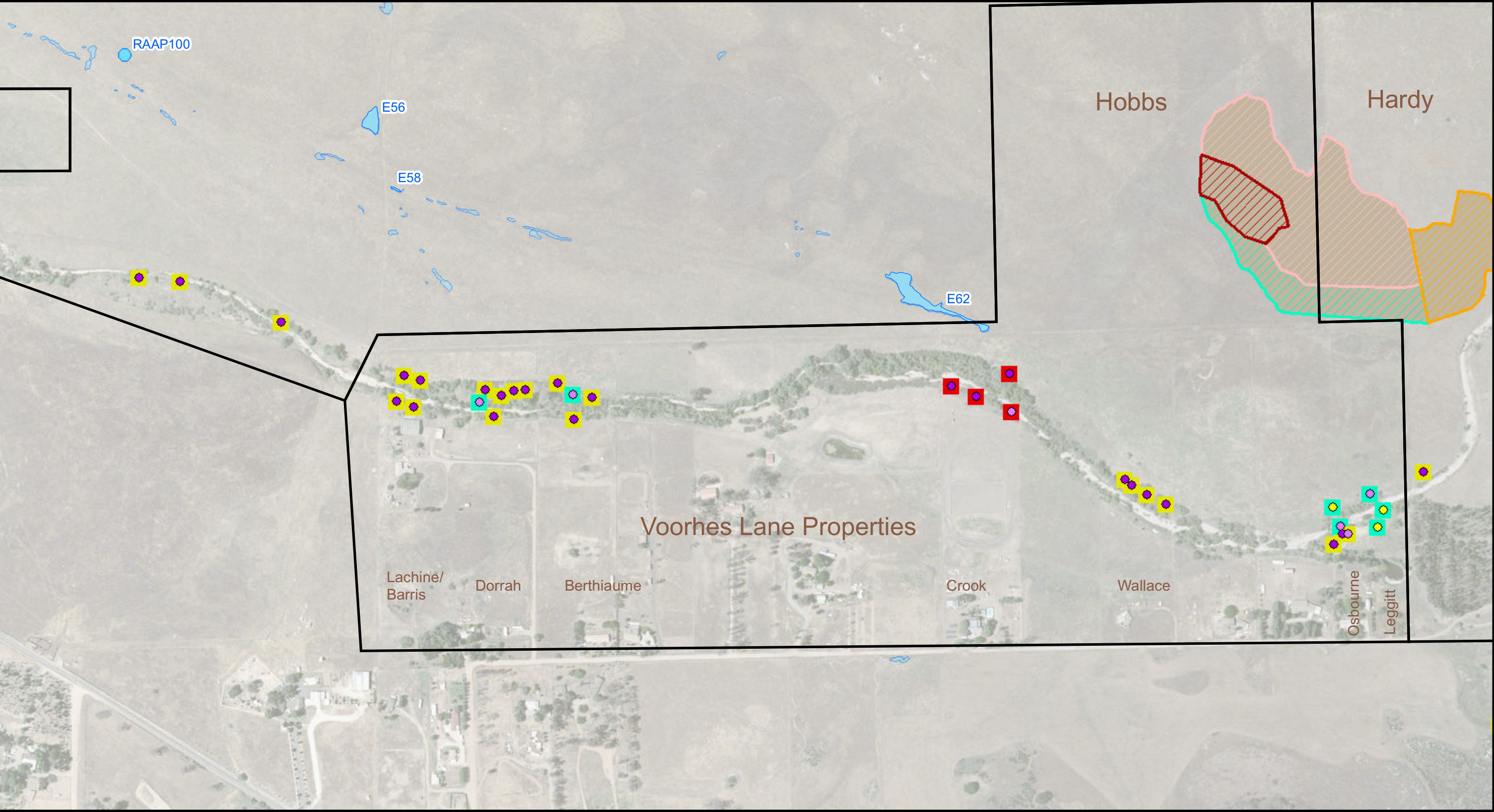


FIGURE 4-3
Ramona Grasslands
2005 Survey Results and
Exotic Species Removal



- Property boundaries
- Vernal Pools
- Burrowing owl
- Arroyo toad
- Bullfrog

- Exotic species**
- Artichoke thistle (*Cynara cardunculus*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)
 - Italian thistle (*Carduus pycnocephalus*)
 - Milk thistle (*Silybum marianum*)
 - Giant cane (*Arundo donax*)
 - Lepidium (*Lepidium latifolium*)
 - Tamarisk (*Tamarix sp.*)

- Treatment method**
- Aqua Master
 - Hand removed
 - Transline & Aqua Master
 - Transline 32oz
 - Transline 84oz
 - No action

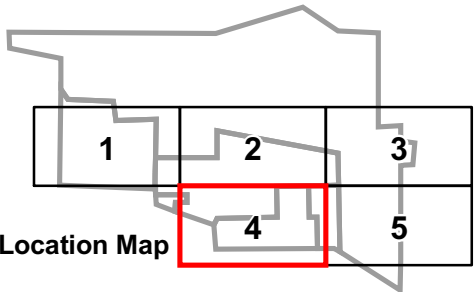
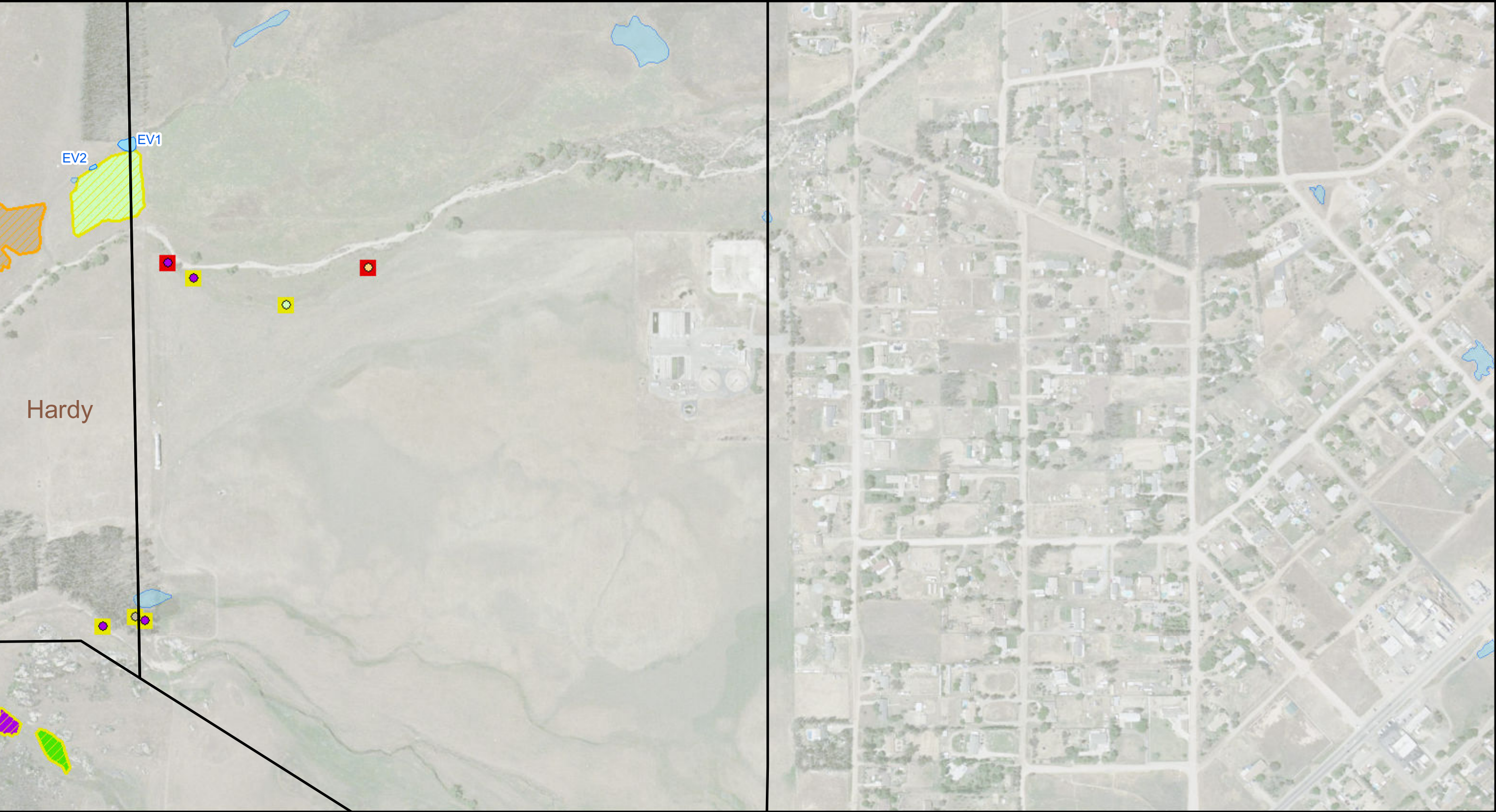


FIGURE 4-4
Ramona Grasslands
2005 Survey Results and
Exotic Species Removal



- Property boundaries
- Vernal Pools
- Burrowing owl
- Arroyo toad
- Bullfrog

- Exotic species**
- Artichoke thistle (*Cynara cardunculus*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)
 - Italian thistle (*Carduus pycnocephalus*)
 - Milk thistle (*Silybum marianum*)
 - Giant cane (*Arundo donax*)
 - Lepidium (*Lepidium latifolium*)
 - Tamarisk (*Tamarix sp.*)

- Treatment method**
- Aqua Master
 - Hand removed
 - Transline & Aqua Master
 - Transline 32oz
 - Transline 84oz
 - No action

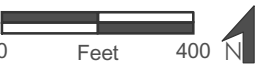
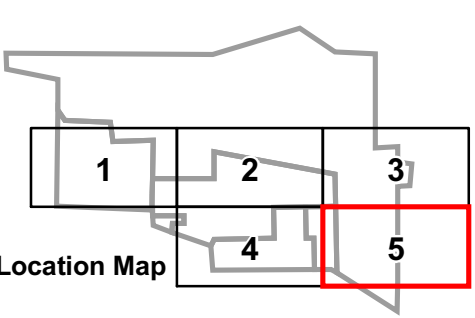


FIGURE 4-5
Ramona Grasslands
2005 Survey Results and
Exotic Species Removal

ATTACHMENT 2



PHOTOGRAPH 1
Vernal Pool r24, Looking East



PHOTOGRAPH 2
Vernal Pool e44, Looking East



PHOTOGRAPH 3
Vernal Pool e45, Looking East



PHOTOGRAPH 4
Vernal Pool e46, Looking West



PHOTOGRAPH 5
Vernal Pool e52, Looking West



PHOTOGRAPH 6
Vernal Pool e53, Looking North



PHOTOGRAPH 7
Vernal Pool e54, Looking South



PHOTOGRAPH 8
Vernal Pool e56, Looking West



PHOTOGRAPH 9
Vernal Pool e58



PHOTOGRAPH 10
Vernal Pool e59, Looking North



PHOTOGRAPH 11
Vernal Pool e62, Looking Northwest



PHOTOGRAPH 12
Vernal Pool e77, Facing South



PHOTOGRAPH 13
Vernal Swale ev1, Facing North



PHOTOGRAPH 14
Vernal Swale ev2, Facing West



PHOTOGRAPH 15
Alkali Playa raap 100. Facing North



PHOTOGRAPH 16
Vernal Swale vs1, Installing Staff Gauge



PHOTOGRAPH 17
Vernal Swale vs2, Facing Northwest



PHOTOGRAPH 18
Vernal Swale vs4, Facing Northwest